Hearing loss and associated medical conditions among individuals 65 years and older

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ABSTRACT

Background: Hearing loss is prevalent, but few studies have investigated its associations with common medical conditions.
Objective: The objective was to assess the prevalence of medical conditions among individuals with hearing loss, compared to those without hearing loss, in people aged 65 years and older.
Methods: The National Health Interview Survey (NHIS) collects data on a variety of health-related topics, including disability. Three years of NHIS data (2011–2013; unweighted n = 53,111) were pooled to examine subpopulations of individuals with hearing loss. Comparisons were made between adults aged 65 and older with, and without, self-reported hearing loss. Statistical analysis included descriptive frequencies, Chi-square tests, and multiple logistic regressions. The outcomes of interest included self-reported diagnosis of arthritis, cardiovascular disease, diabetes, high blood pressure, emphysema, stroke, cancer, asthma, multiple chronic conditions, health status, and obesity.
Results: Hearing loss prevalence was nearly 37%. After adjusting for sociodemographics, smoking status, and disability, hearing loss was independently associated with the following conditions: arthritis (OR 1.41; 1.27–1.57), cancer (OR 1.35; 1.21–1.5), cardiovascular disease (OR 1.48; 1.33–1.66), diabetes (OR 1.16; 1.03–1.31), emphysema (OR 1.41; 1.14–1.74), high blood pressure (OR 1.29; 1.17–1.43), and stroke (OR 1.39; 1.12–1.66). There was an association with worse health status over the past year (OR 1.5 (1.3–1.73).
Conclusions: Hearing loss among older individuals is independently associated with increased disease burden and poorer self-reported health. Future studies are needed to investigate the mechanistic nature of these associations, and whether improved access to hearing healthcare surveillance can reduce the overall health burden among these individuals.

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1. Introduction

Hearing loss (HL) is prevalent among older Americans, with 25% of those ages 65–74 years, and 50% of those older than 75 years having a disabling hearing loss.[1–3] It is the third leading chronic health condition after arthritis and hypertension.[4] A number of epidemiologic studies show that HL is associated with lower income,[5] social isolation, poorer mental health, depression, lower cognitive function,[6,7] and impaired activities of daily living.[8,9] More recently, HL has been linked to increased hospitalization, falls, and mortality among older populations.[10] The estimated healthcare costs attributable to HL are increasing rapidly, and are projected to exceed $3 billion as of 2010.[11]

Individuals with HL are more likely to have lower socioeconomic status, lower annual family income, poorer educational achievement, and higher rates of unemployment.[5] HL prevalence is higher among certain racial and ethnic groups. For example, American Indians/Alaskan Natives and whites have the highest prevalence of HL, whereas blacks have the lowest.[1,12,13] Additional factors that appear to be associated with HL include; smoking tobacco, drinking five or more alcoholic drinks daily, being a veteran of a war, occupational and firearm related noise exposure, obesity, diabetes,[14] and hypertension.[4,14] The degenerative and age-related decline in hearing organs may be enhanced by the presence of other chronic medical conditions, such as diabetes mellitus (DM), cardiovascular

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disease, and renal disease. Despite high HL prevalence and associated health burden, there continues to be limited knowledge about the relationship between HL and the presence of many common chronic medical conditions.

We investigated whether HL is associated with a variety of common physical diseases using the National Health Interview Survey (NHIS), specifically; we tested our hypothesis that respondents with self-reported HL have a higher prevalence of physical conditions and poorer health status than those reporting no HL, independent of sociodemographic factors.

2. Methods

Initiated in 1957, the National Health Interview Survey (NHIS) collects data on a variety of health-related topics among Americans.[15] These nationally-representative survey data are frequently used to monitor trends in health, illness, disability, and health behaviors, as well as evaluate policies aimed to improve health and healthcare.[15] The NHIS employs a stratified multistage sample design, which provides precise, unbiased, national and Census region estimates for the community-dwelling population and priority subgroups.

A limited amount of data is gathered on all members of sampled households, and on family-level characteristics; additional information is gathered on one randomly selected adult (the sample adult) in each household. Three years of data (2011—2013) were pooled to enable examination of a small subpopulation of interest, including people with HL. The final sample size, including only those who had responses for all variables of interest was 11,173 unweighted, 41,619,220 weighted; for the HL group, the sample size was 4,018, weighted N = 7,828,317. Self-responses were required from all adults, unless they were not physically or mentally able,[15] in which case a knowledgeable proxy was questioned. Only 1430 (1.4%) of responses were provided via proxy.

A person was considered to have mild or worse HL if they reported "a little trouble hearing," "moderate trouble," "a lot of trouble," or "deaf," when asked how well he/she hears without the use of hearing aids or other listening devices. The outcomes of interest were self-reported diagnosis of arthritis, cardiovascular disease, diabetes, high blood pressure, emphysema, stroke, cancer, asthma, and obesity, which we examined separately. People who reported diagnoses of more than one chronic condition were defined as having multiple chronic conditions. Additionally, we investigated current self-rated health status (excellent/very good/ good vs. fair/poor), health status now compared to a year ago (better/worse/same). Obesity was defined as having a body mass index (BMI) above 30. Covariates factors included gender, race/ ethnicity (non-Hispanic white, non-Hispanic black, non-Hispanic other, Hispanic), education (<high school, high school graduate, > high school), marital status (married vs. divorced/widowed/separated/never married), region of residence (Northeast, Midwest, South, West), poverty status (<100% FPL, using the NHIS variable on the ratio of family income to the family-size adjusted poverty threshold), health insurance status (insured, uninsured), and smoking status (never, current, or former smoker). Other (non-hearing) disabilities (physical limitation, visual impairment, intellectual disability, or mental disability) were also measured. Physical limitations were defined as anyone who indicated that walking ¼ mile and/or climbing stairs is "somewhat difficult," "very difficult," or "can't do at all." Individuals who reported having difficulty seeing, even with glasses or contact lenses, were considered to having vision impairments. People were considered to have an intellectual disability or mental disability if they reported that they had functional limitations that resulted from these conditions. Analyses were conducted with SPSS, accounting for the complex

sampling design of the NHIS.[16] All data were weighted using the person weight, divided by 3, for the number of years of data pooled. Comparisons were made between people aged 65 and older with and without HL. We treated all responses that were "inapplicable," "not ascertained," don't know," or "refused," as missing. Statistical analysis included descriptive frequencies, Chi-square tests, and multiple logistic regressions. Interaction terms in logistic regressions were used to test age by HL differences.

3. Results

Nearly 37% of community-dwelling adults aged 65 years and older in the US reported having mild HL or worse (Table 1). Compared to those with no HL, people with HL were more likely to be male, white, less educated, married, to have a disability other than HL, and to smoke.

After adjusting for sociodemographics, smoking status, and disability, HL was independently associated with the following conditions: arthritis (OR 1.41; 1.27—1.57), cancer (OR 1.35; 1.21—1.5), cardiovascular disease (OR 1.48; 1.33—1.66), diabetes (OR 1.16; 1.03—1.31), emphysema (OR 1.41; 1.14—1.74), high blood pressure (OR 1.29; 1.17—1.43), and stroke (OR 1.39; 1.12—1.66) (Table 2). There was an association with worse health status over the past year (OR 1.5 (1.3—1.73)) and the presence of multiple chronic conditions (OR 1.67; 1.49—1.87) (Table 2).

4. Discussion

Our results show that HL was independently associated with

Table 1
Characteristics of adults aged 65 or older with hearing loss and without hearing loss.

	No Hearing Loss	Hearing Loss
Total (weighted n)	63.2% (40,327,893)	36.8% (23,484,952)
Male	39.3	55.8
Married	58.0	58.4
Race/Ethnicity		
Hispanic	8.5	5.9
White, non-Hispanic	76.6	84.7
Black, non-Hispanic	10.3	5.5
Other, non-Hispanic	4.6	3.9
Education		
<HS	57.6	60.2
HS	14.1	15.2
HS+	28.3	24.6
Health Insurance	99.1	99.5
Region		
Northeast	19.5	16.7
Midwest	21.2	23.4
South	37.1	37.6
West	22.2	22.3
Poverty	9.8	9.0
Other Disability	31.3	47.2
Smoking		
Current	9.0	8.4
Former	37.9	46.5
Never	53.1	45.1
Arthritis	44.6	56.2
Asthma	10.2	10.5
Cancer	22.3	29.5
Cardiovascular Disease	25.1	37.9
Diabetes	18.9	23.9
Emphysema	3.7	7.0
Fair/Poor Health	17.1	28.1
Health Status worse than a year ago	9.0	15.5
High Blood Pressure	58.8	67.8
Obese	25.4%	26.6%
Multiple Chronic Conditions	58.2%	73.3%
Stroke	6.7%	10.4%

All bivariate comparisons significant at p < 0.001.